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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,936	04/03/2001	Jacques Schmitt	H37-091 DIV	9938
21706	7590	10/03/2005	EXAMINER	
NOTARO AND MICHALOS 100 DUTCH HILL ROAD SUITE 110 ORANGEBURG, NY 10962-2100			CROWELL, ANNA M	
			ART UNIT	PAPER NUMBER
			1763	

DATE MAILED: 10/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/824,936

Applicant(s)

SCHMITT, JACQUES

Examiner

Michelle Crowell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-12 is/are pending in the application.
- 4a) Of the above claim(s) 2 and 9-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4 and 6-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 April 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Status of the Claims*

Claims 1-4 and 6-12 are pending. Claims 2 and 9-12 are withdrawn from consideration.

Claims 1, 3, 4, and 6-8 are rejected.

### *Continued Examination Under 37 CFR 1.114*

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 18, 2005 has been entered.

### *Drawings*

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the **standing wave special oscillation** must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure

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must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1, 3, 4, and 6-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the new limitation of the "internal process space having a size to normally form a standing wave spacial oscillation therein" which is indefinite. From the specification and the drawings, it is unclear where the standing wave is formed. Is the standing wave formed between the two electrodes 3, 5 and thus depends on the distance between the two electrodes 3, 5 or is the standing wave formed between the chamber walls 1 and thus depends on the distance between the chamber walls 1?

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 3, 4, and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanada (Japanese Patent Publication 08-186094) in view of Shang et al. (U.S. 6,177,023) and Collins et al. (U.S. 5,210,466).

Referring to Drawings 1 and 2 and the abstract, Hanada discloses a capacitively coupled radio frequency plasma reactor 19 comprising: at least two electrically conductive electrodes 12 and 21 spaced from each other, each electrode having an external surface, an internal process space 11 enclosed between the electrodes, a gas providing means 16 for providing the internal process space with a reactive gas, at least one radio frequency generator 29 connected to at least one of the electrodes, at a connection location, for generating a plasma discharge in the process space, a means 26 to evacuate the reactive gas from the reactor, at least one substrate 1 defining one limit of the internal process space, to be exposed to the processing action of the plasma discharge, the at least one substrate extends along a general surface and is arranged between the electrodes, at least one dielectric layer 21a has at least one non planar-shaped external surface (Fig. 2 and abstract) extending outside the internal process space, the dielectric layer being a capacitor that is electrically in series with the substrate and the plasma, and the dielectric layer having a capacitance per unit surface values which are not uniform along at least one direction of

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the general surface, for generating a given distribution profile, especially for compensating a process non uniformity in the reactor.

Hanada fails to teach a radio frequency generator for frequencies greater than 13.56 MHz and at least one substrate with a largest dimension of at least 0.7m.

Referring to column 4, lines 26-47, Collins et al. discloses a capacitively coupled radio frequency plasma reactor using a radio frequency generator which applies frequencies greater than 13.56 MHz (50-800 MHz) since higher frequencies provide commercially viable processing rates and substantial reduction in sheath voltages. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention for the radio frequency generator of Hanada to apply frequencies greater than 13.56 MHz as taught by Collins et al. since higher frequencies provide commercially viable processing rates and substantial reduction in sheath voltages.

Referring to column 5, lines 58-63, Shang et al. teaches a plasma reactor for processing a substrate for flat panel displays with a largest dimension up to 1m. It is well known in the art to scale up or down an apparatus to accommodate the desired substrate size. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Hanada with a substrate having a largest dimension up to 1m in order to process substrates for flat panel displays and furthermore since it is well known in the art to scale up or down an apparatus to accommodate the desired substrate size and. Additionally, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984),

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cert. denied, 469 U.S. 830, 225 USPQ 232 (1984)).

With respect to the “internal process space having a size to normally form a standing wave spacial oscillation therein”, it should be noted that the combination of Hanada, Shang, and Collins teaches a structure of a large-sized reactor operating at above 13.56 MHz and processing a large substrate with a dimension larger than 0.7 m. In addition, while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function (In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-32 (Fed. Cir. 1997)). In the instant case and stated above, the apparatus of Hanada, Shang, Sato, and Collins teaches the structural limitations, thus it is inherent that at high frequencies above 13.56 MHz and a large reactor sized to accommodate a 1 m substrate, standing wave oscillations will occur between the chamber walls.

With respect to claim 3, the dielectric layer 21a has a thickness “a” along a direction perpendicular to the general surface of the substrate 1, the thickness being non uniform along the dielectric layer, so that the reactor has a location-dependent capacitance per unit surface values along the general surface (Fig. 2 and abstract).

With respect to claim 4, the dielectric layer 21a is the thickest in front of the location in the process space 11 which is the furthest away from the connection location where the radio frequency generator 29 is connected to the at least one electrode and the thickness decreases from the process space location as the distance between the process space location and the connection location on the corresponding electrode decreases (Fig. 1 and abstract).

With respect to claim 6, at least one of the electrodes 21 has a non planar-shaped surface facing the substrate 1 (Figs. 1 and 2).

With respect to claim 7, the dielectric layer 21a is locally delimited by a surface of one of the electrodes 21, and the delimitation surface of the one electrode is curved (Fig. 1 and 2).

With respect to claim 8, the dielectric layer comprises a solid dielectric layer (Figs. 1, 2 and abstract).

6. Claims 1, 3, 4, and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanada (Japanese Patent Publication 08-186094) in view of Shang et al. (U.S. 6,177,023) and Sato et al. (6,199,505)

Referring to Drawings 1 and 2 and the abstract, Hanada discloses a capacitively coupled radio frequency plasma reactor 19 comprising: at least two electrically conductive electrodes 12 and 21 spaced from each other, each electrode having an external surface, an internal process space 11 enclosed between the electrodes, a gas providing means 16 for providing the internal process space with a reactive gas, at least one radio frequency generator 29 connected to at least one of the electrodes, at a connection location, for generating a plasma discharge in the process space, a means 26 to evacuate the reactive gas from the reactor, at least one substrate 1 defining one limit of the internal process space, to be exposed to the processing action of the plasma discharge, the at least one substrate extends along a general surface and is arranged between the electrodes, at least one dielectric layer 21a has at least one non planar-shaped external surface (Fig. 2 and abstract) extending outside the internal process space, the dielectric layer being a capacitor that is electrically in series with the substrate and the plasma, and the dielectric layer having a capacitance per unit surface values which are not uniform along at least one direction of the general surface, for generating a given distribution profile, especially for compensating a process non uniformity in the reactor.



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Hanada fails to teach a radio frequency generator for frequencies greater than 13.56 MHz and at least one substrate with a largest dimension of at least 0.7m.

Referring to column 2, lines 37-65, column 4, line 40-column 5, line 40, Sato et al. discloses a capacitively coupled radio frequency plasma reactor designed to use a radio frequency generator which applies frequencies greater than 13.56 MHz (30-300 MHz) (col. 2, lines 53-56) and that processes a substrate with a largest dimension of at least 0.7m (1 m) (col. 2, lines 37-44) since it is important to uniformly process large substrates at high frequencies with a reduced weight, dimension, and cost to the overall apparatus. Additionally, higher frequencies provide commercially viable processing rates and substantial reduction in sheath voltages and larger substrates yield increased product throughput. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to design the reactor of Hanada to apply frequencies greater than 13.56 MHz and accommodate at least one substrate with a largest dimension of at least 0.7m. as taught by Sato et al. since there is a growing demand in industry to uniformly process large substrates at high frequencies with a reduced weight, dimension, and cost to the overall apparatus. Additionally, higher frequencies provide commercially viable processing rates and substantial reduction in sheath voltages and larger substrates yield increased product throughput.

Moreover, referring to column 5, lines 58-63, Shang et al. teaches a plasma reactor for processing a substrate for flat panel displays with a largest dimension up to 1m. It is well known in the art to scale up or down an apparatus to accommodate the desired substrate size. Additionally, it is well known in the art to scale up/down the power in order to accommodate the desired substrate size (col. 6, lines 58-60). Thus, it would have been obvious to one of ordinary

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skill in the art at the time of the invention to provide the apparatus of Hanada with a substrate having a largest dimension up to 1m with appropriate power level in order to process substrates for flat panel displays and furthermore since it is well known in the art to scale up or down an apparatus to accommodate the desired substrate size. Additionally, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984)).

With respect to the “internal process space having a size to normally form a standing wave spacial oscillation therein”, it should be noted that the combination of Hanada, Shang, and Sato teaches a structure of a large-sized reactor operating at above 13.56 MHz and processing a large substrate with a dimension larger than 0.7 m. In addition, while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function (In *re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-32 (Fed. Cir. 1997)). In the instant case and stated above, the apparatus of Hanada, Shang, Sato, and Collins teaches the structural limitations, thus it is inherent that at high frequencies above 13.56 MHz and a large reactor sized to accommodate a 1 m substrate, standing wave oscillations will occur between the chamber walls.

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dielectric layer, so that the reactor has a location-dependent capacitance per unit surface values along the general surface (Fig. 2 and abstract).

With respect to claim 4, the dielectric layer 21a is the thickest in front of the location in the process space 11 which is the furthest away from the connection location where the radio frequency generator 29 is connected to the at least one electrode and the thickness decreases from the process space location as the distance between the process space location and the connection location on the corresponding electrode decreases (Fig. 1 and abstract).

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With respect to claim 7, the dielectric layer 21a is locally delimited by a surface of one of the electrodes 21, and the delimitation surface of the one electrode is curved (Fig. 1 and 2).

With respect to claim 8, the dielectric layer comprises a solid dielectric layer (Figs. 1, 2 and abstract).

### ***Response to Arguments***

7. Applicant's arguments filed August 18, 2005 have been fully considered but they are not persuasive.

8. Applicant has argued that it is believed that the Examiner is using hindsight based on the comments of Shang about scale up/down and that the problem of the standing wave is not resolved; however, in response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight

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reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and **does not include knowledge gleaned only from the applicant's disclosure**, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Shang et al. clearly teaches it is well known to scale up/down an apparatus (i.e. chamber size, power level, substrate holder) in order to accommodate a large sized substrate (col. 5, lines 60-63, col. 6, 55-67). Additionally, in column 2, lines 31-34, Sato et al. teaches it is conventional known to scale up an apparatus in order to accommodate a larger substrate. Thus, to process a larger substrate in the apparatus of Hanada, it is obvious to scale the apparatus of Hanada based on the teachings of Shang et al. Therefore, the teachings of Hanada '094 in view of Collins et al. '466 and Shang et al. '023 satisfy the claimed requirements. Furthermore, the requirement of apparatus claims simply means that the prior art must teach the claimed structure and does not necessarily have to address the problem (standing wave effect) and solution presented in the current invention; however, the prior art of Hanada, Shang, Sato, and Collins teaches that the shape of the dielectric layer 21a and lower electrode 21b (Hanada) promotes plasma uniformity and thus would compensate for non-uniformity due to the standing wave effect. Therefore, the apparatus of Hanada, Shang, Sato, and Collins satisfies the claimed requirements.

9. Applicant has argued that none of the cited prior art has reactor sizes and frequencies which, in combination, show the feature of the standing wave effect; however, it should be noted that the combination of Hanada, Shang, Sato, and Collins teaches a structure of a large-sized reactor operating at above 13.56 MHz and processing a large substrate with a dimension larger

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than 0.7 m, and since the apparatus of Hanada, Shang, Sato, and Collins teaches the structural limitations, it is inherent that at high frequencies above 13.56 MHz and with a large reactor sized to accommodate a 1 m substrate, standing wave oscillations will occur between the chamber walls. Furthermore, on page 9, paragraph 4, the applicant admits that the standing wave phenomenon will occur with the prior art. Therefore, the apparatus of Hanada, Shang, Sato, and Collins satisfies the claimed requirements.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (9:30 -6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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